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DEPARTMENT OF COMMERCE

BUREAU OF STANDARDS

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. Hyper-sensitizing of Photographic Plates

During the past month special attention has been given to the matter of obtaining and interpreting sensitometer curves of photographic plates as a means of selecting emulsions best suited for certain problems in aerial photography. Six dyes have been submitted for test by the Bureau of Aircraft Production; these include excellent yellow and red sensitizers. Four samples of a dye similar to dicyanin prepared by the chemical division of the Bureau of Standards are being investigated. One of these appears to give greater sensitiveness in a part of the extreme red than any dye previously examined at the Bureau. It may become of great importance for both military and scientific purposes. A member of the staff has cooperated with the Bureau of Aircraft Production at an aviation field in the preparation and use of stained plates. The spectroscopic qualities of light from the landscape, sky, and haze were studied under conditions obtaining both on the ground and at altitudes up to 14000 feet.

2. Optical Glass Production

During the month of September 3 melts of medium flint were made, 2 of dense barium crown, 3 of barium flint, 13 of light barium crown, and 2 of borosilicate glass. Usable optical glass produced during the month amounted to 2650 lbs.

3. Other Refractories

A new spark plug body has been made up for test and kiln runs have been made on bodies for saggers used in the firing of spark plugs. Five mixtures of refractory mortar to be used in the setting of marine boilers were prepared.

4. Annealing of Optical Glass

At the request of an optical glass plant under the control of the Navy Department, the Bureau prepared an exhaustive statement regarding the annealing temperature and rates of cooling required for the manufacture of optical glass. The signifi-

cance of the upper and lower limits of annealing temperature was set forth and the approximate value of these limits for the usual glasses were tabulated. The effect of decreases in temperature on the time required for the relaxation of the stresses was shown. It was shown also that little is gained by carrying out the annealing at higher temperatures, since the necessary limitation on the maximum rate of cooling precluded any great advantage in time. Further reason for annealing at as low a temperature as possible is found in the change of the rate of cooling which appears to occur in the case of borosilicate crown between 580° C and 480° C. Such changes in the thermal properties of the glass suggest the possibility of added stresses of considerable magnitude during the cooling. This point is being given further investigation. A study was made to determine the minimum time required for annealing, such that the time required for the stresses to vanish plus the time required for cooling should be minimum. Proper design of the annealing furnace is essential to the most rapid and accurately controlled annealing since much time may be lost if the insulating properties and heat capacity of the furnace are not well adapted to the size of the samples to be annealed.

5. Visibility and Camouflage in Warfare

Investigations and tests bearing on this subject are now the principal activity of one section of the Bureau. Studies have been made in the duplication of light filters and confidential publications have been issued on the subject. The preparation of standard filters for experiments on visibility and the detection of camouflage is in progress. In the field of color physics, tests have recently been carried out on the diffuse reflection of 13 samples, the spectral reflection of 7 samples in the ultraviolet and in the visible, and the spectral transmission of green glass; and information was given in response to requests, on the spectral transmission of yellow light filters, on quartz tube mercury lamps,- all of

the above being for the military services.

6. Dark Signalling

Field tests on dark signalling methods were carried on by the Bureau recently using a 300 candlepower gas-filled tungsten stereoptican lamp in a 12 inch reflector, an 80 candlepower tungsten street lamp and a 20 candlepower tungsten lamp in an 8 inch automobile headlamp, measurements of the effective distances of transmission being made in each case.

7. Test of Balloon Gas Plant

The Bureau prepared an extended report on the quality and yield of the gas obtained during the trial run of the new hydrogen gas plant for balloon filling at Langley Field. Measurements were made of purity of the gas, and other data required to determine the plant performance were taken. These tests were the basis of the settlement between the government and the builders of the plant, the amount of whose compensation was determined by the quantity and quality of gas produced. Small errors, especially in the analysis of the gas, would have affected the compensation to be paid by thousands of dollars.

8. Electro-plating Investigations

This work is increasing in interest and importance and an additional expert with long experience in electro-plating problems has been attached to the Bureau's staff. The Bureau has cooperated in preparing specifications for the lead lining of gas shells which is shortly to be undertaken on a large scale. In cooperation with the Bureau of Mines, studies are in progress on very heavy nickel deposits and it is now possible to obtain deposits of nickel up to 1/8" or more in thickness, permitting the production of seamless nickel tubes up to 8" or more in diameter, of irregular shaped vessels, such as pressure flasks, etc., and possibly also the very heavy nickeling of cooking utensils and surgical instruments. Installation of zinc plating processes in compliance with the decision of the Aeronautic Division of the Navy Department with respect to the use of zinc plating on metal parts of naval airplanes, is proceeding

satisfactorily; it may be said that the principal difficulty being encountered in the application of this process is involved in cases where secret or proprietary solutions have been used, rather than the well-known solutions recommended by the Bureau, the properties of which have been investigated and are understood.

9. Balloon Fabrics

The work of testing balloon fabrics is increasing in volume, 235 balloon fabrics having undergone test during the month of September. In addition, 5 extensive reports on the results of exposure tests recently completed were prepared. A study is being made of the methods of making balloon seams including the use of cement for such seams. The use of the microscope in these studies is proving a valuable resource. The determination of the permeability of fabrics to "C" gas is nearly completed and investigation of the inflammability of this gas with mixtures of hydrogen has been brought to a close and reported on.

10. Protective Coatings

Conferences have been held on the question of changing from nickel plating to tinning of thong cases; on prepared roofing, built-up roofing and the maintenance of roofing already in place; on the standardization of finishes on hardware, metal tools, etc.; rust preventive and leather preservatives. At the request of the Ordnance Department, a material of German origin known as "Chromol" and intended for use as a rust preventive and leather preservative was given careful study. As a result of this work, it appeared that the material had no particular merit over preparations already available and in use. At the request of the Trench Warfare Section of the Ordnance Department, an effort has been made to develop a varnish which could be applied to the greasy surfaces of rifle grenades. A varnish made by dissolving rosin in solvent naptha, it is believed, will satisfy the requirements. An artificial hydrate of iron prepared by the West Coast Kalsomine

Company of West Berkeley, California, known as "Ferrite Yellow" which has been suggested as a suitable paint material, appears, as a reault of preliminary tests, to be an excellent substitute for the imported Ochre. It is to be noted that the quality of creosote oil now now offered on the market is likely to be very bad as samples recently examined have frequently shown as much as 75% of tar.

11. Marine Enamel Substitutes

Materials known respectively as "Maritime Dauber" and "Maritime Plastic" have been received from the Navy Department for investigation. The former is to be applied with a brush, followed by the latter applied by means of a trowel, designed to take the place, respectively, of the priming solution and the hot mopped bituminous enamel for protection of interior surfaces of steel ships. From the preliminary examination, it appears that unless explosive hazard might occur from slow evaporation of the solvent, these materials will serve their purpose excellently. They are, moreover, applied more readily than the materials which they are proposed to replace.

12. Substitute for Chloroform as Freezing-point Depressant

In fire extinguishers of the carbon tetrachloride type, chloroform has been regularly used to depress the freezing point low enough to insure satisfactory and dependable operation of the extinguisher at the very low temperatures likely to be met in practice. At the request of the War Industries Board and the Office of the Quartermaster General, the Bureau is investigating the matter of possible substitutes for the chloroform, which is a material that can ill be spared for such uses. Results of some promise have been achieved but they cannot be considered as finally established until some additional experimental work has been carried out.

13. Fireproofing of Fabrics.

Investigation has been made of the methods available for the fireproofing of silk flare parachutes and recommendations made as the result of this work were adopted by the Navy Department.

Respectfully,

S. W. STRATTON

Director